CLAIMS

What is claimed is:

1. A method for acquiring a projection data set, comprising:

rotating a gantry comprising a distributed X-ray source slowly about a volume of interest, wherein the path of the gantry comprises a plurality of arcs;

emitting X-rays from a portion of the distributed X-ray source overlying an active arc;

designating a next sequential arc in the direction of rotation the active arc when a trailing edge of the distributed X-ray source coincides with the boundary between the active arc and a preceding arc until each arc has been the active arc at least once; and

acquiring a projection data set comprising a plurality of projections generated from the emitted X-rays.

2. The method as recited in claim 1, further comprising:

generating a set of interpolated projections by interpolating the projection data set using a set of concurrently acquired phase data and frequency content of the projection data set, wherein each interpolated projection characterizes the projection data set at a view location of the gantry and at a particular time; and

reconstructing the set of interpolated projections to generate one or more images.

3. The method as recited in claim 2, further comprising:

associating two or more images to generate a volume rendering.

4. The method as recited in claim 2, wherein the volume of interest comprises a heart having a cardiac period.

5. The method as recited in claim 4, wherein a rotational period of the distributed X-ray source and the gantry about the heart approximately equals the cardiac period multiplied by the number of arcs.

6. The method as recited in claim 2, wherein interpolating the projection data set comprises reducing statistical noise in the projection data set.

7. The method as recited in claim 6 further comprising reducing an X-ray dose applied to the volume of interest in response to the reduction in statistical noise.

8. The method as recited in claim 1, wherein a rotational period of the gantry is greater than eight seconds.

9. A computer program, provided on one or more computer readable media, for acquiring a projection data set, comprising:

a routine for rotating a gantry comprising a distributed X-ray source slowly about a volume of interest, wherein the path of the gantry comprises a plurality of arcs;

a routine for emitting X-rays from a portion of the distributed X-ray source overlying an active arc;

a routine for designating a next sequential arc in the direction of rotation the active arc when a trailing edge of the distributed X-ray source coincides with the boundary between the active arc and a preceding arc until the distributed X-ray source has completed at least one rotation of the gantry; and

acquiring a projection data set comprising a plurality of projections generated from the emitted X-rays.

10. The computer program as recited in claim 9, further comprising:

a routine for generating a set of interpolated projections by interpolating the projection data set using a set of concurrently acquired phase data and the frequency content of the projection data set, wherein each interpolated projection characterizes the projection data set at a view location of the gantry and at a particular time; and

a routine for reconstructing the set of interpolated projections to generate one or more images.

11. The computer program as recited in claim 10, a further comprising:

a routine for associating two or more images to generate a volume rendering.

12. The computer program as recited in claim 10, wherein the volume of interest comprises a heart having a cardiac period.

13. The computer program as recited in claim 12, wherein the routine for rotating the distributed X-ray source rotates the distributed X-ray source in a rotational period approximately equal to cardiac period multiplied by the number of arcs.

14. The computer program as recited in claim 10, wherein the routine for generating a set of interpolated projections reduces statistical noise in the projection data set.

15. The computer program as recited in claim 14, further comprising a routine for reducing an X-ray dose applied to the volume of interest in response to the reduction in statistical noise.

16. The computer program as recited in claim 12, wherein the routine for rotating the gantry rotates the gantry in a rotational period greater than eight seconds.

17. A CT image analysis system, comprising:

a gantry comprising a distributed X-ray source configured to slowly rotate about a volume of interest, wherein the path of the gantry comprises a plurality of arcs, wherein the distributed X-ray source is configured to emit a stream of radiation from the portion of the X-ray source overlying an active arc;

a detector configured to detect the stream of radiation and to generate one or more signals responsive to the stream of radiation, wherein the detector comprises a plurality of detector elements;

a system controller configured to control the X-ray source and to acquire a set of projection data during one or more slow rotations of the X-ray source about a dynamic object from one or more of the detector elements via a data acquisition system; and

a computer system configured to receive the set of projection data and to designate a next sequential arc in the direction of rotation the active arc when a trailing edge of the distributed X-ray source coincides with the boundary between the active arc and a preceding arc until the distributed X-ray source has completed at least one rotation of the gantry.

18. The CT image analysis system as recited in claim 17, wherein the computer system is further configured to generate a set of interpolated projections by interpolating the set of projection data using a set of concurrently acquired phase data and the frequency content of the set of projection data, wherein each interpolated projection characterizes the projection data set at a view location of the gantry and at a particular time and to reconstruct the set of interpolated projections to generate one or more images.

19. The CT image analysis system as recited in claim 18, wherein the computer system is further configured to associate two or more images to generate a volume rendering.

20. The CT image analysis system as recited in claim 18, wherein the dynamic object comprises a heart having a cardiac period.

21. The CT image analysis system as recited in claim 20, wherein a rotational period of the distributed X-ray source approximately equals the cardiac period multiplied by the number of arcs.

22. The CT image analysis system as recited in claim 18, wherein generating a set of interpolated projections reduces statistical noise in the set of projection data.

23. The CT image analysis system as recited in claim 22, wherein the computer is further configured to reduce an X-ray dose applied to the volume of interest in response to the reduction in statistical noise.

24. The CT image analysis system as recited in claim 17, wherein a rotational period of the gantry is greater than eight seconds.

25. A CT image analysis system, comprising:

means for generating a projection data set comprising projections acquired at different instants in time with respect to a cardiac cycle at each view position of a CT gantry; and

means for generating a set of interpolated projections using the projection data set.

26. The CT image analysis system as recited in claim 25, further comprising:

means for reconstructing the set of interpolated projections to generate one or more images; and

means for associating two or more images to generate a volume rendering.